Cholesterol

Spinsolve™ 60

Cholesterol belongs to the group of sterol lipids. It is biosynthesized by all animal cells and is essential for the structure of cell membranes. It also functions as precursor for the biosynthesis of steroid hormones and vitamin D. Figure 1 shows the ^{1}H NMR spectrum of 250 mM Cholesterol in $CDCl_3$ measured in a single scan taking 10 seconds to acquire.

1D Proton spectrum

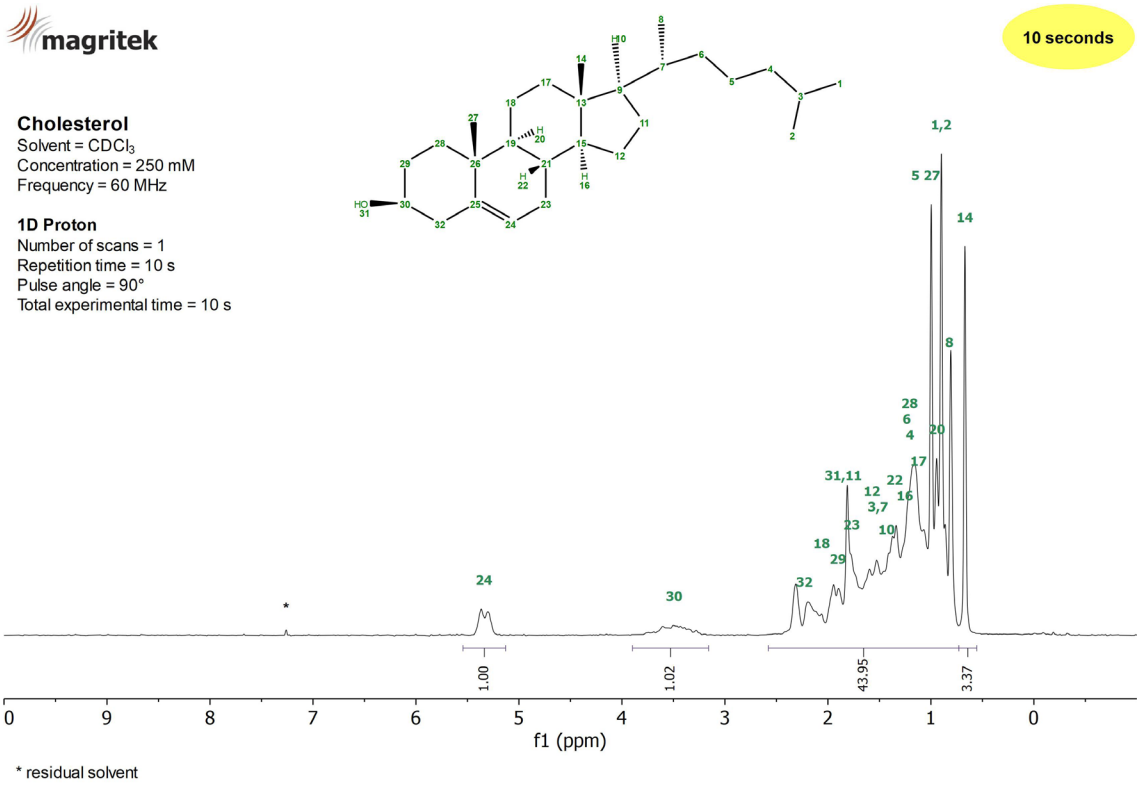

Figure 1: ^{1}H NMR spectrum of 250 mM Cholesterol in $CDCl_3$ measured on a Spinsolve 60 MHz system in a single scan.

1D Carbon spectrum

Figure 2 shows the ^{13}C NMR spectrum of 250 mM Cholesterol in $CDCl_3$ acquired using NOE polarization transfer from ^{1}H to ^{13}C and ^{1}H decoupling. The 1D Carbon experiment using NOE is sensitive to all ^{13}C nuclei in the sample. It clearly resolves all the expected resonances.

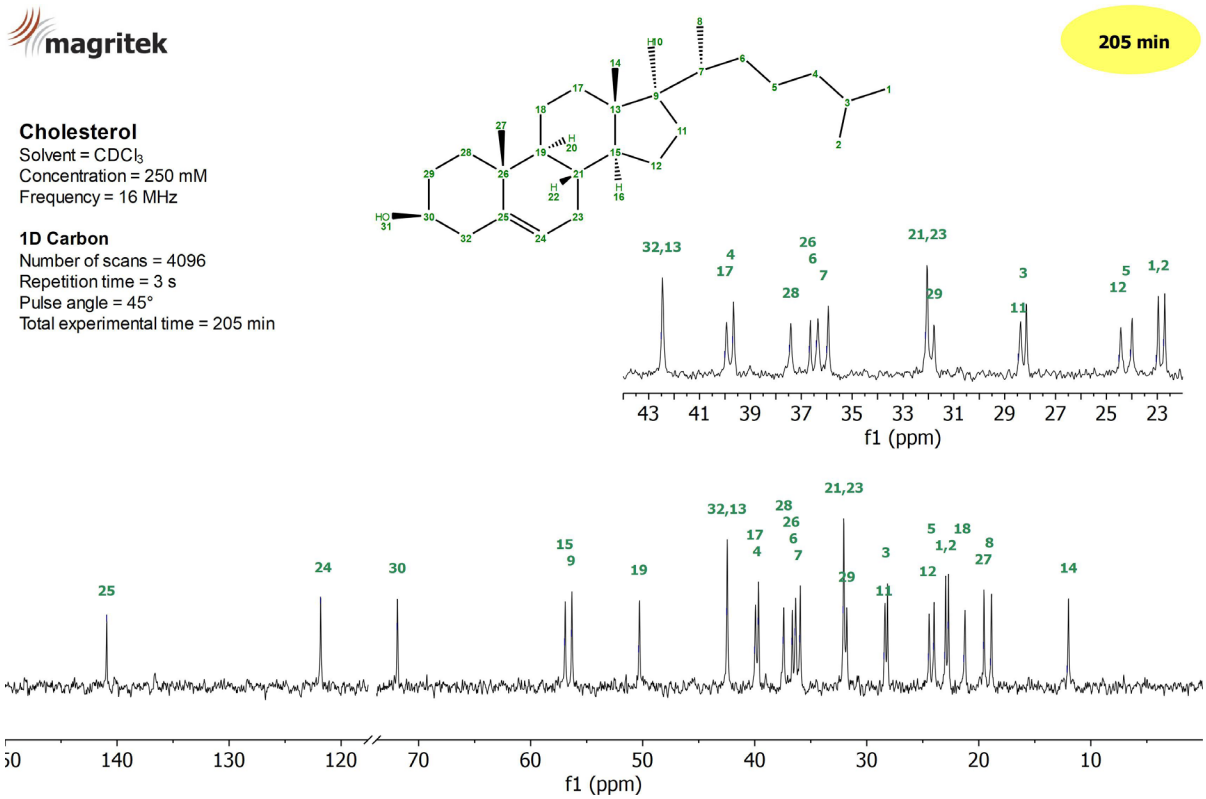

Figure 2: ^{13}C NMR spectrum of 250 mM Cholesterol in $CDCl_3$ measured on a Spinsolve 60 MHz system in 205 minutes.

2D COSY spectrum

The 2D COSY experiment allows one to identify coupled ^{1}H nuclei as they generate cross peaks out of the diagonal of the 2D data set. In Figure 3 a large number of cross peaks can be nicely observed. For example, the proton at position 24 couples to protons 23 and 32 (pink), the proton 30 couples to protons 29 (light green) and protons 32 (orange).

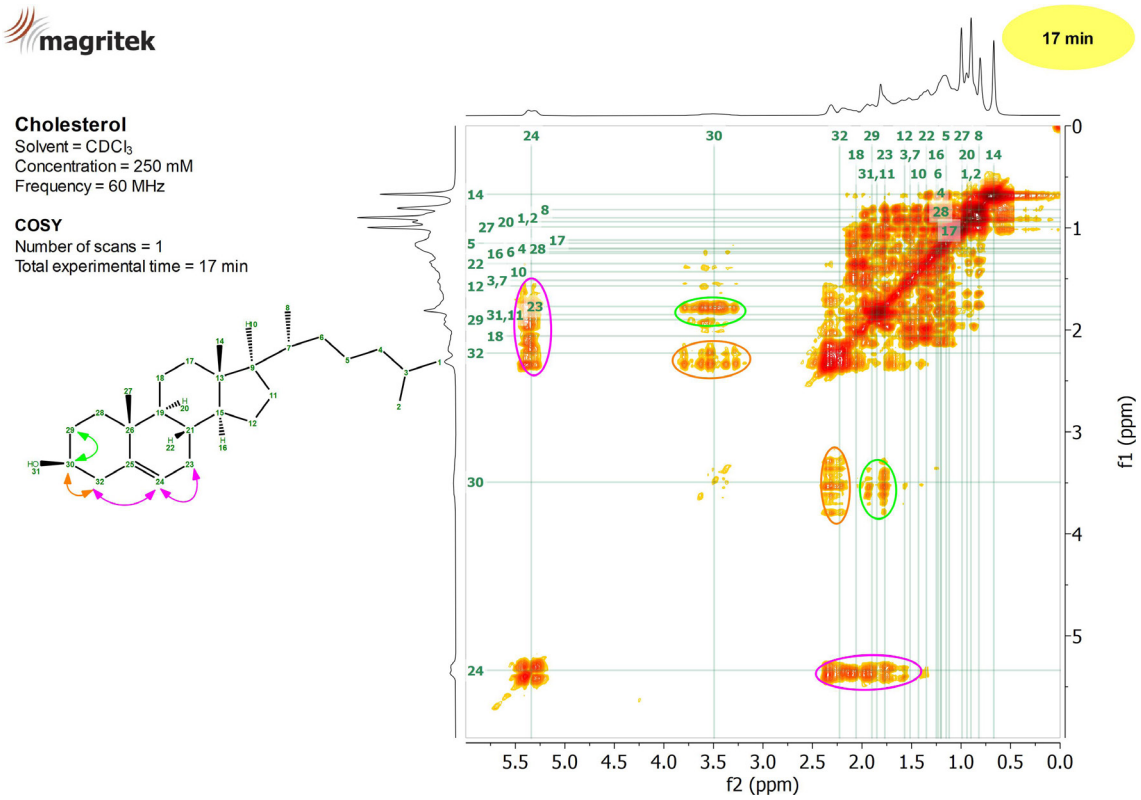

Figure 3: ^{1}H 2D COSY experiment of 250 mM Cholesterol in $CDCl_3$ acquired in 17 minutes on a Spinsolve 60 MHz system.

2D HSQC-ME

The HSQC is a powerful sequence widely used to correlate ^{1}H with the one-bond coupled ^{13}C nuclei. The Spinsolve is equipped with a multiplicity edited version (HSQC-ME) of this method. It provides the editing power of the DEPT-135 sequence, which is useful to differentiate the signals of CH_2 groups (blue) from CH and CH_3 groups (red). Figure 4 shows the HSQC-ME spectrum of 250 mM Cholesterol in $CDCl_3$ acquired in 34 minutes.

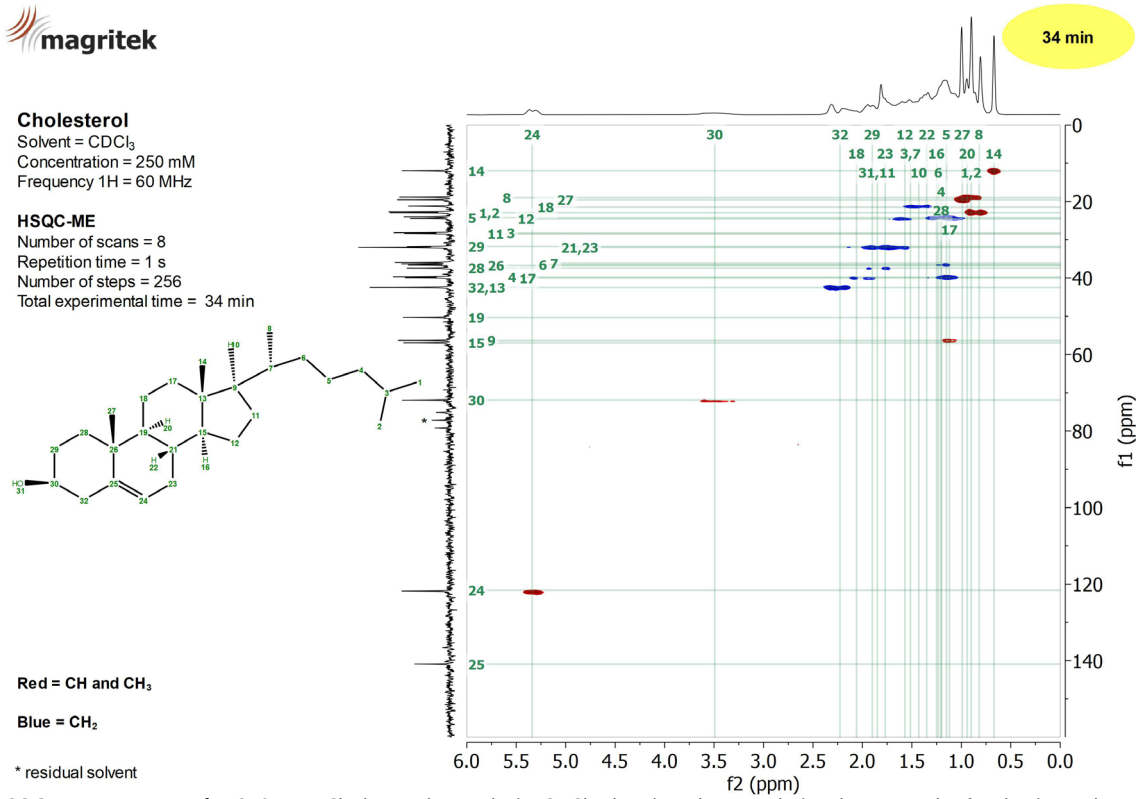

Figure 4: HSQC-ME spectrum of a 250 mM Cholesterol sample in $CDCl_3$ showing the correlation between the ^{1}H (horizontal) and ^{13}C (vertical) signals.

2D HMBC

To obtain long-range ^{1}H-^{13}C correlations through two or three bond couplings, the Heteronuclear Multiple Bond Correlation (HMBC) experiment can be used. Figure 5 shows the HMBC spectrum of a 250 mM Cholesterol sample measured in 69 minutes on our Spinsolve 60 MHz. As an example, the long-range correlations of proton 32 with carbons 29 (dark pink), 30 (pink), 24 (light blue) and 25 (orange) are marked with circles. The experiment shows the correlation with quaternary carbons, too.

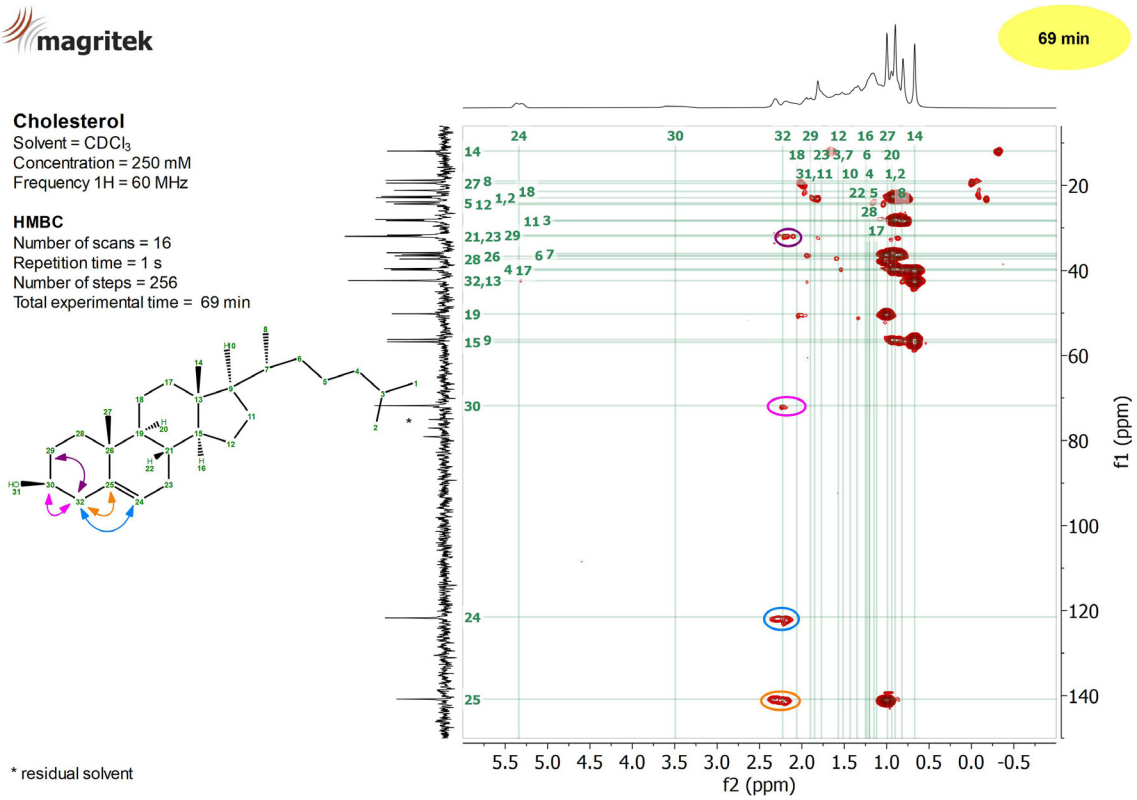

Figure 5: HMBC spectrum of a 250 mM Cholesterol sample in $CDCl_3$ showing the long-range couplings between ^{1}H and ^{13}C nuclei.